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Borders as boundaries to fiscal policy interactions? An empirical analysis of politicians' opinions on rivals in the competition for firms

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Abstract

**Borders as Boundaries to Fiscal Policy Interactions?
An Empirical Analysis of Politicians' Opinions on Rivals in the
Competition for Firms**

Benny Geys and Steffen Osterloh

Studies of spatial policy interdependence in (local) public policies usually concentrate on the relations between jurisdictions within a single analysed region, and disregard possible extra-regional effects. However, the theoretical spatial statistics literature shows that biased estimates might emerge if spatial interactions extend beyond the boundaries of the available data (i.e., the boundary value problem). This paper empirically assesses the practical relevance of this concern by studying German local politicians' assessments of their jurisdictions' main competitors in the struggle to attract firms. We find that location near a border significantly undermines politicians' perception that the fiercest competitive pressure derives from jurisdictions within their own state. This effect sets in about 20km (10.2km) from a national (international) border. These results indicate that nearest municipalities perceive each other as competitors regardless of the state or country where they are located, which has important implications for estimating spatial dependence models.

Keywords: Government interaction, boundary value problem, border effects, policy interdependence

JEL classification: D24, D60, H71, H72

1 Introduction

A government deciding public policies in one jurisdiction is likely to affect – and be affected by – decisions of governments in other jurisdictions (e.g., due to spillover effects or strategic decision-making). The resulting spatial policy interdependence has received significant attention in economics, urban geography and political science in recent years, both in terms of its measurement and its implications (for partial reviews, see Brueckner, 2003; Revelli, 2005). A central concern in empirical analyses of such spatial policy interactions relates to the specification of the neighbourhood matrix, i.e., ‘who competes with whom’. As these ‘spatial weights’ generally cannot be directly estimated from the data (due to a lack of degrees of freedom; e.g., Anselin, 1988; Case et al., 1993), their choice is finally at the discretion of the researcher and critically depends on the underlying theoretical model. For instance, when the focus lies on the competition of public authorities to attract mobile capital (as in this paper), the spatial weights should ideally reflect the mobility of capital between these jurisdictions (Brueckner, 2003). However, most previous work relies on a simple contiguity- or distance-based neighbourhood-specification. Additionally, the spatial weights are generally defined with reference to only a limited group of countries in the literature on international competition (e.g., Devereux et al., 2008) or with reference to other jurisdictions *within* one particular region when studying local competition (the focus of this paper).¹

The latter operational choice might, however, not be innocuous. Since spatial interactions could extend beyond the boundaries of the analysed region, jurisdictions *within* the dataset might be spatially autocorrelated with jurisdictions *outside* the observed data. While early theoretical contributions to the spatial econometrics literature have shown that the presence of such ‘boundary value problem’ or ‘edge effect’ would “result in a biased estimate of spatial dependence when ignored” (Anselin, 1988: 173; see also Griffith and Amrhein, 1983; Griffith, 1983), very little is known about the practical relevance of this theoretical concern. As a result, the empirical literature on spatial policy interactions has by and large ignored the issue. Yet, in our view, the boundary value problem’s potential significance for applied work should be subject to direct empirical scrutiny. Only by

¹Prominent examples in the local tax competition literature include, among several others, Brueckner and Saavedra (2001) on cities in the Boston metropolitan area, Brett and Pinkse (2000) on municipalities in the Canadian province of British Columbia, and Buettner (2003) on jurisdictions in the German state of Baden-Württemberg.

doing so, we can establish whether or not empirical researchers should worry about the edge effect and the resulting potential for “considerable bias into parameter estimates” (Griffith, 1983: 377). This argument is further substantiated by the fact that the sign of the ensuing bias on the estimated spatial gradients is a priori unclear. Establishing the sign of the bias “involves identifying properties of the spatial processes under study” in each individual case (Griffith, 1983: 378), such that general predictions cannot easily be formulated, and no simple rule-of-thumb can be devised to adjust the obtained (biased) spatial gradients.

This paper takes a first step to assess this issue – i.e., spatial dependence transcending identified borders – by addressing two related questions. First, do jurisdictions near a border compete only with jurisdictions on their own side of the border (as implicitly assumed in most previous work), or do they have a broader reference group? This question regards what could be designated as a pure *border effect*; it evaluates the constraining strength of borders. Second, how far ‘inland’ do competitive pressures from beyond the borders reach? This question pertains to the radius within which the neighbourhood to another region is taken into account by local decision-makers (a *proximity effect*).

There are only few studies on border-transcending interactions based on standard spatial econometric techniques, but the results remain inconclusive (Gérard et al., 2010; Eugster and Parchet, 2011; Cassette et al., 2012). As there are limitations to the analysis of social interactions based on observed outcomes (Manski, 1993, 2000), this paper takes a complimentary approach and tackles both questions by surveying politicians about their perceptions of their jurisdictions’ most important competitors. This follows the suggestion by Manski (2000) that subjective data can help provide evidence on relevant reference groups.

While politicians’ opinions have until now not been explicitly exploited to define jurisdictions’ peer groups, the competitive forces underlying intergovernmental interactions are hard to measure objectively, which makes that politicians’ *beliefs* are particularly likely to become of crucial importance. In line with this idea, Revelli and Tovmo (2007) illustrate that spatial policy dependence is particularly strong between jurisdictions where politicians *believe* that voters engage in benchmarking of their performance against other jurisdictions (for a related finding, see Brülhart and Parchet, 2010). This suggests that

politicians' opinions about the importance of competitive pressures (and the extent of tax base mobility) have important implications for their policy decisions, and that these opinions contain valuable information for analyses of intergovernmental competition.

Our empirical results are based on both ordered probit, OLS and natural spline regressions using survey data from over 700 German municipal leaders in the state of Baden-Württemberg. They show that most politicians perceive other municipalities within their own state as the strongest competitors. Yet, in municipalities 'near' a border, politicians also perceive a strong competitive threat from across the border. This corroborates the idea that municipalities near a border have a broader reference group than is commonly assumed. Moreover, the importance of borders as a dividing line varies depending on the type of border. First, *ceteris paribus*, their effect is weaker (i.e., less constraining) for national than international borders. Decision-makers in municipalities up to roughly 20km from a national, inter-regional border (or about 10% of the maximum possible distance to such a border in our sample) take competition with jurisdictions beyond the border into consideration, while the equivalent effect of an international border ceases after approximately 10.2km (or about 5% of the maximum possible distance). Although these distances appear relatively small, it comprises 21% and 9.5% of all municipalities in the state, respectively. Second, the French-German border is in our sample shown to have a stronger dividing effect than the Swiss-German border, which may reflect the difference across both borders in terms of language, institutions (EU versus non-EU) or policies (i.e., Switzerland's more aggressive corporate tax policy). Overall, our findings suggest that geographically close municipalities perceive each other as competitors for mobile capital regardless of the state or country where they are located. This, in turn, implies a need for careful consideration of potential 'edge effects' in empirical analyses of spatial fiscal interactions to avoid biased inferences on parameters of spatial dependence (Griffith, 1983, 1985; Anselin, 1988).

The remainder of the paper is structured as follows. Section 2 reviews the types of spatial weights matrices commonly employed in the literature and derives testable hypotheses concerning the effect of (inter)national borders. Section 3 discusses our data and the empirical methodology employed. The results are described in section 4, while section 5 contains a concluding discussion.

2 Literature overview and hypotheses

2.1 Hypotheses on the effect of (proximity to) borders

Independent of the underlying theoretical framework, operationalisations of a jurisdiction's 'neighbourhood' in studies of spatial policy interdependence most often rely on a simple contiguity- or distance-based criterion. Neighbours are thereby defined as two jurisdictions that share a border (e.g., Heyndels and Vuchelen, 1998; Geys, 2006 ; Rincke, 2007) or are within a certain Euclidian or travel distance from each other (e.g., Büttner, 2001, 2003 ; Bosch and Solé-Ollé, 2007; Brett and Tardiff, 2008). In a similar vein, the inverse of the distance between jurisdictions is often invoked to approximate the strength of the assumed competitive relation between them (e.g., Brueckner and Saavedra, 2001; Charlot and Paty, 2007; Koh and Riedel, 2010). Such distance-based criteria can be justified by the fact that proximity is important for the dissemination of information – certainly at the local government level (Allers and Elhorst, 2005) – and is linked to relocation decisions of both individuals (Day, 1992) and firms (van Dijk and Pellenbarg, 2000).²

Most studies on spatial policy interactions implicitly assume that the world ends at the region's border, as they apply contiguity- or distance-based specifications of the neighbourhood matrix only *within* one analysed region. Although this is often due to data limitations, the theoretical spatial statistics literature has shown that ignoring cross-border effects – when they are present – is likely to generate biased inferences on the central spatial parameters. This is known as the 'boundary value problem' or 'edge effect' (Griffith, 1983, 1985; Anselin, 1988). Still, we generally do not know whether such cross-border interactions are effectively present in real-world data. Hence, it remains an empirical question whether the edge effect has any relevance for the study of fiscal policy interactions.

In theory, there are several reasons why decision-makers in jurisdictions near a border might perceive themselves to have a peer group that extends beyond the own region.

²Some scholars move beyond a merely geographical neighbourhood criterion by including information on, for example, relative population sizes, migration patterns between jurisdictions (Case et al., 1993; Baicker, 2005; Rincke, 2010) or, in studies of international tax competition, the level of trade integration between countries (Prakash and Potoski, 2006; Exbrayat, 2009).

This opens the door to potential cross-border interactions because borders are no longer perceived by decision-makers to be insurmountable obstacles for, for example, mobile capital. In some sense, the state or country border then represents an “artificial border” (Griffith, 1983: 378) with little relevance in practice. Moreover, such effects need not be constrained to jurisdictions physically located at the border (e.g., effects of cross-border trade and smuggling often persist at considerable distances from the border; Asplund et al., 2007; Lovenheim, 2008; Beatty et al., 2009). Such proposition follows naturally from the commonly acknowledged central importance of distance (see above); indeed, while the existing literature consistently assumes that distance is crucial *within a given region*, the same logic easily transfers to jurisdictions *outside that region*. Doing so implies that proximity to jurisdictions outside the analysed region defines the extent to which local decision-makers perceive the intensity of competition with these jurisdictions (relative to those within the own state). This leads to a first testable hypothesis:

H1: Proximity to jurisdictions beyond subnational or international borders shifts politicians’ perceptions on the relative importance of ‘internal’ and ‘external’ competitors: they perceive a stronger competitive pressure from ‘external’ competitors; a *proximity effect*.

Clearly, however, the mere existence of borders is likely to retain at least some ‘closing-off’ effect. Indeed, although Basile et al. (2009) demonstrate that location choices for multinationals in Europe are becoming increasingly uncoupled from national borders due to increased integration, significant evidence indicates that borders continue to impede trade (McCallum, 1995; Anderson and van Wincoop, 2003), even in highly integrated areas such as NAFTA and the European Union (EU). Some authors explain this persistence by the existence of technical barriers (e.g., Chen, 2004), while others suggest that cultural factors (e.g., Guiso et al., 2009) or asymmetries in judicial systems (e.g., Turrini and van Ypersele, 2010) are driving forces of the border effect.

While this suggests a perceptible effect of international borders, a similar effect could also be expected from subnational borders in a federal state such as Germany. In our German setting, such effect might be driven by cultural factors since state borders in Germany largely coincide with historical and/or cultural borders, and the latter have been shown to still matter for economic decisions such as migration (e.g., Falck et al.,

2012). It may also be caused by institutional factors as firms need to register at chambers of commerce (IHK), whose authority coincides with state borders. Furthermore, employment conditions (including wages) are often defined in so-called “master contracts” arranged at the state level. Such administrative requirements increase the cost of firm mobility across state borders. Finally, German municipalities are geographically arranged in districts (Landkreis) and represented in state-level organisations (Gemeindetag), both of which have an advisory and coordination function and lead to information exchange. Moreover, their statistical and accounting systems are coordinated at the state level. As a result, local decision-makers are likely to be much better informed about the policies of municipalities in the same state, thus becoming more likely to focus on municipalities in the same state as their reference group.

Taken together, state borders are likely to have a relatively weaker ‘closing-off’ effect than national borders since mobility as well as information costs are arguably lower across the former. This discussion leads to our second hypothesis:

H2: Both national and international borders are perceived as real barriers; a *border effect*. International borders are likely to exert a stronger influence than national ones.

Given the institutional setting analysed below (i.e., municipalities in the German state of Baden-Württemberg), the latter hypothesis can be specified a bit further. As Baden-Württemberg shares a direct border with both France and Switzerland, this provides the possibility to test for diverging effects of different types of international borders. On the one hand, the border with France has a much stronger cultural dimension than the one with Switzerland as Swiss municipalities near the Swiss-German border are German-speaking. On the other hand, France is a member of the EU, while Switzerland is not (although many of the economic freedoms provided by the EU apply to transactions with Switzerland) and has its own currency. Hence, there might be a larger institutional hurdle for firms to move from Germany to Switzerland than from Germany to France as they effectively leave the EU-area in the former case. Analysing how politicians’ perceptions of their jurisdictions’ main competitors varies along the French and Swiss borders provides an opportunity to gain some (preliminary) insight into the relative importance of these two effects. This is reflected in our third and final hypothesis:

H3: The effect of international borders varies with the cultural and institutional dimensions of such borders. The exact nature (and strength) of such mediating effects is theoretically open and thus constitutes an empirical question.

2.2 Politicians' beliefs and policy interactions

A few works have previously looked into the presence of cross-border interactions using standard reaction function approaches, with mixed results. While Gérard et al. (2010) identify policy interactions between municipalities in the same Belgian region, they do not find interactions between municipalities located in different regions. Similarly, Cassette et al. (2012) find no evidence of fiscal interactions across the French-German border. Eugster and Parchet (2011), however, find that municipalities along a (language) border in Switzerland also compete with neighbours beyond their own region, even though the border weakens the extent of interaction. Here, we take a complimentary approach and – rather than rely on observed outcomes – follow Manski's advice to employ information “from careful elicitation of persons' subjective perceptions of the interactions in which they participate” (Manski 2000: 117). In particular, we employ politicians' beliefs on their rivals in the competition for firms to help disclose the role of borders as boundaries and, thereby, the practical relevance of the edge effect.

Politicians' beliefs are likely to play a critical role in interjurisdictional competition. Revelli and Tovmo (2007), for example, indicate that the spatial parameter estimated for local government efficiency patterns in Norway is significantly larger for jurisdictions whose politicians *believe* that voters employ other jurisdictions' performance as a yardstick. More generally, politicians' beliefs are likely to matter for their decisions independent of whether they are correct (i.e., accurately reflecting reality). On the one hand, if one assumes that rational politicians have unbiased beliefs, their decisions will reflect the underlying reality. Even then, however, politicians' subjective opinions will continue to matter in settings where the underlying reality is hard to measure objectively (such as, for example, concerning inter-jurisdictional competitive forces). In such a setting, objective data are arguably ‘unavailable’, and subjective perceptions – which in this case are assumed unbiased – become central to the decision-making process.

On the other hand, if one allows for biased beliefs, the actual truth (e.g., mobility of firms) might become less relevant than politicians’ perception thereof, since it is this perception that shapes their decisions. This idea rests on a substantial academic literature indicating that individuals’ actions in a wide variety of situations are more often driven by subjective perceptions than objective facts.³ Politicians are unlikely to be immune to such effects. Evidence in this direction is provided by Brülhart and Parchet (2010) who find that Swiss municipalities strategically interact in their inheritance tax decisions *in the belief that tax competition takes place*. However, the authors do not find any tax base effects induced by tax differentials. Hence, politicians apparently base their decisions on wrong assumptions about the mobility of the taxable object (referred to as “alleged tax competition” by Brülhart and Parchet, 2010: 1). It is then only a small step to exploit politicians’ subjective perceptions about the *identity* of their most important competitors, rather than their view on the mere existence of such competitors (as studied in, e.g., Ashworth and Heyndels, 1997, 2000; Hendrick et al., 2007; Heinemann and Janeba, 2011), in empirical analyses of policy interactions.

3 Data and methodology

3.1 Data

We employ data from a self-conducted survey that asked local decision-makers in the German state of Baden-Württemberg about their perceptions of the competitive pressures between various jurisdictions. We selected this setting for two main reasons. First, local business tax revenues (i.e., the ‘Gewerbesteuer’) make up roughly 48% of municipal tax revenue (or 21% of total revenues; figures for 2004), and constitute the main source of tax revenues for local governments in Baden-Württemberg (e.g., Geys et al., 2010 ; Kalb et al., 2012). Moreover, previous research found evidence of strong competition between municipalities in this state (Büttner, 2001, 2003; Hauptmeier et al., 2012). This indicates the relevance of business tax revenues and competition for such revenues within our setting. Second, there exists a quasi-presidential system in the municipalities of

³With respect to US tax policy, Slemrod (2006) and Sides (2010) analyse the critical role of voter misconceptions and ignorance in explaining voters’ views on, for example, the repeal of estate taxation and the replacement of income taxes by flat or retail sales taxes.

Baden-Württemberg, with a strong mayor and a rather weak council. This is important since it implies that the decision-makers we surveyed (i.e., the mayors, see below) have real decision-making power regarding fiscal policies.⁴

Specifically, we addressed the mayors of all 1108 municipalities in Baden-Württemberg via mail in May 2008. The survey obtained a response rate of 64.3%, thus providing a sizeable sample (N=712). Both the sample size and response rate are exceptionally high compared to the few previous economic studies of politicians' opinions (Ashworth and Heyndels, 1997, 2000 ; Hendrick et al., 2007; Heinemann and Janeba, 2011). Also, and importantly, this sample is representative of the entire population in terms of the geographical distribution of the municipalities (see table 4 in the appendix). There are some quantitatively minor, but statistically significant, differences with respect to population size, unemployment rate, fiscal capacity and political make-up. Hence, we directly control for the influence of these variables in the analysis below.

The central question of interest for our purpose is the following: "With which cities and municipalities do you perceive yourself to be particularly in competition for businesses?" Respondents were thereby asked to assess the strength of competitive pressures on a discrete scale from -4 (not at all regarded as competitors) to +4 (very strongly regarded as competitors) regarding three types of jurisdictions: (Q1) cities and municipalities in Baden-Württemberg, (Q2) cities and municipalities in other German states, and (Q3) cities and municipalities in other countries.⁵

The distribution of responses is illustrated in figure 1. Clearly, and unsurprisingly, most respondents regard internal competitors (i.e., those from the state of Baden-Württemberg) as their most important competitors. Still, significant variation exists across respondents, especially when they are asked about external competitors (i.e., those from other states or countries). Moreover, and crucially, respondents often strongly vary their responses across the three types of competitors mentioned. This not only indicates that

⁴Mayors are elected directly by the citizens for eight-year periods and lead the administration of the municipality. Moreover, they preside over the local council and have full voting rights there. This generates a unique combination of executive authority and agenda-setting power.

⁵The original wording in German is: "Mit welchen anderen Städten und Gemeinden sehen Sie sich besonders im Wettbewerb um Unternehmensansiedlungen?" We would have preferred to ask about the exact identity of a jurisdiction's competitors rather than using this indirect question. However, the municipalities' joint representation organisation (Gemeindetag Baden-Württemberg) only granted permission to field the survey without such a direct question (which was deemed too sensitive). As addressing the municipalities without such permission generally leads to extremely low response rates, we agreed to a more indirect phrasing.

answers to the survey were taken seriously, but also that mayors indeed perceive and report differences in the extent of competitive pressures across the three groups mentioned. It is this variation we exploit in our analysis.

[Figure 1 about here]

3.2 Specification and Methodology

Our baseline specification takes the following form:

$$RPC_i = a + b_1 Border_i + X_i b_2 + e_i$$

The left-hand-side variable, Relative Perceived Competition (RPC), is constructed as the difference of the perceived intensity of competition between two types of competitors: those inside and those outside the state. This effectively leads to two separate variables:

- a) RPC^{state} , which is calculated as the perceived intensity of competition with municipalities in other German states (Q2) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1),
- b) $RPC^{country}$, which measures the perceived intensity of competition with municipalities in other countries (Q3) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1).

A value of zero in either case denotes that a given respondent regards municipalities in other German states (or other countries) as equally important competitors compared to municipalities in the own state. A negative (positive) value denotes that municipalities in the same (other) state or country are more important competitors.

The central explanatory variables relate to the geographical placement of municipalities. We introduce a number of different operationalisations to address our various hypotheses. First, to study the impact of direct neighbourhood to a state border (see H2), we introduce a dummy variable equal to 1 for municipalities directly located on one of Baden-Württemberg's borders to its three surrounding German states (i.e., Bavaria, Hessen and Rhineland-Palatinate), and 0 otherwise. Such an indicator variable is appro-

appropriate since there are no major institutional differences between these three neighbouring states. Altogether, 54 municipalities in our sample (7.6%) are located adjacent to a state border. Second, to study the impact of direct neighbourhood to a country border (see H2), we introduce an indicator variable equal to 1 for municipalities bordering France (18 municipalities) or Switzerland (likewise 18 municipalities), and 0 otherwise. Given the institutional and cultural differences between these neighbours, we differentiate between the effect of the Swiss and the French border (see H3). Third, to estimate the spatial reach of borders' effects (see H1), we replace the dummies for adjacent municipalities with distances to the closest municipality beyond a state or country border (and its squared value to capture non-linearities).⁶

Finally, in the vector X_i , we introduce a number of socio-economic control variables, which are summarised in table 5 in the appendix. They first of all comprise the municipal unemployment rate and the population of working age. Then, we include two political variables reflecting the share of seats in the local council held by left-wing parties and independents (so-called "Freie Wählervereinigungen"), respectively. They capture the influence of the ideological position of a given jurisdiction, and are included because political ideology has been shown to significantly affect politicians' perception of business tax competition (Heinemann and Janeba, 2011). Thirdly, we introduce dummies identifying those municipalities which are the main beneficiaries of transfers in the local system of fiscal equalisation. Since these municipalities are arguably partially protected from competition (i.e., the system compensates for losses in municipalities' tax bases; Büttner, 2006), their decision-makers might have different perceptions of competitive pressures.⁷ Fourth, we insert a dummy indicating that survey responses were given directly by the mayor (rather than delegated by him to a member of his bureaucracy). Finally, municipal size and dummies for highly agglomerated cities intend to capture that urban centres are generally more exposed to external competition, as demonstrated by Janeba and Osterloh (2012).

⁶Distances are thereby defined as the minimum distance between the centres of the relevant jurisdictions. They are calculated using the longitude and latitude position for each jurisdiction while accounting for river crossings (bridges and ferries).

⁷We exploit a discontinuity in the local system of fiscal equalization, which categorises municipalities according to their "fiscal capacity" and gives those with a low fiscal capacity the highest contribution rate, i.e., compensates them most extensively for reductions in their tax base (see Büttner, 2006).

Before we turn to our estimation results, it is important to mention three aspects regarding our estimation methodology. First, we centre all control variables by subtracting their means. Hence, all right-hand side variables – except the neighbourhood dummies and the distance measures – are rescaled to have an average of 0. This transformation facilitates the interpretation of our results, especially for the coefficient on the constant, which then becomes the average value for municipalities with average characteristics. Second, given the non-continuous nature of the dependent variables, we implement an ordered probit approach. However, we also ran all estimations using OLS, which facilitates the quantitative interpretation of the results. Both approaches give very similar qualitative results since there is a relatively large number of values the dependent variables can take (i.e., 17 options ranging from -8 to 8). Note that we thereby always present heteroskedasticity-consistent standard errors. Finally, as the effect of proximity to borders is likely to be highly non-linear, we also complement the analysis with natural spline regressions. This particularly accounts for nonlinear effects and allows a much more detailed analysis of the proximity effect (see Beatty et al., 2009 , and Brühlhart et al., 2012 , for recent applications in different settings).

4 Empirical results

4.1 State borders

Table 1 reports our results regarding the impact of subnational borders on mayors' perceptions of inter-jurisdictional competitive pressures. In column 1a (ordered probit) and 1b (OLS), we focus on the impact of direct neighbourhood to a state border. The coefficient of the constant in the OLS estimation should be interpreted as the average value of the relative perception of competition (RPC) among municipalities that are not at a state border. It equals -3.155 and is statistically significant beyond the 1% level. This indicates that mayors on average regard municipalities in their own state as much closer competitors than those beyond the state borders (remember that a value of 0 would set both competitors at the same level). Yet, in line with hypothesis H2, this effect is strongly and statistically significantly counteracted by direct neighbourhood to state borders (see the top row of table 1). This indicates that a decision-maker from a border-municipality

perceives, *ceteris paribus*, much higher competitive pressure from other German states than decision-makers from municipalities in the interior of the state. Nevertheless, even a border-municipality perceives significantly higher competition intensity from municipalities within their own state, which can be seen from the OLS estimation ($-3.155 + 1.953 = -1.202$; $p=0.002$). However, this disaggregation of the constant demonstrates that the apparent strength of this ‘closing-off’ effect of state borders is predominantly driven by the distance of most municipalities to state borders (i.e., the adverse *proximity effect*, see below), and not by the *border effect* itself.

[Table 1 about here]

Replacing the dummies for adjacent municipalities with the distance to the closest municipality beyond a state border (and its squared value) in column (2a) and (2b), two things are worth emphasising. First, the value of the constant term, which now represents the perceptions of mayors on the state border (or, technically, for municipalities where the distance to this border is 0km), is still significantly negative. This re-confirms that, although mayors of municipalities on the border still regard municipalities in their own state as closer competitors than those beyond the state borders, the strength of their perception is much weaker than the estimated average value (which is -3.155, see column (1b)). Second, we find a significant non-linear effect of proximity to borders.

In order to evaluate the implied persistence of the border’s effects in more detail, it is instructive to switch to the results from the natural spline regressions, which are visualised in figure 2. These results first of all confirm that the null hypothesis of “no border effect”, i.e., municipalities regard internal and external competitors as equally important, can be rejected even for municipalities with a very low distance to other states (i.e., the 95%-confidence interval around the point estimate never encompass 0). Second, the lower bound of the confidence interval around the estimated effect intersects with the mean value of the dependent variable, which is represented by the horizontal line in figure 2, at a distance of 20.2 kilometres. This indicates a significant and strong (but declining) proximity effect in the perceptions of the mayors of municipalities up to 20.2 kilometres from the state border (in line with H1). Beyond this point, the estimated

value is no longer statistically significantly different from the average of all jurisdictions. Consequently, our results indicate that politicians’ perceptions become ‘immune’ to extra-regional competitive forces at distances beyond 20km from the border. Altogether, 233 out of the 1108 municipalities of the state are located within this critical distance (21.0%).

In table 6 in the appendix, we present several robustness checks to rule out that our findings are driven by spurious correlations. Such spurious results could come about, for instance, if economic activity in Baden-Württemberg were mainly located close to the border, and our results pick up neighbourhood to such close-to-the border economic centres rather than the border itself. In columns (1) and (2), we therefore control for agglomeration and accessibility effects by including the distance to the closest regional and secondary centre within the state (column (1)) or the ESPON road accessibility indicator (column (2)).⁸ In both cases, our baseline findings are only marginally affected, and the added variables remain statistically insignificant. In column (3), we add a dummy reflecting neighbourhood to an international border (which can be seen as a placebo test in regressions analysing opinions on inter- versus intra-state competitors). The estimated coefficient of this dummy variable is very close to zero and statistically insignificant. Also in column (3), we experiment with two separate state border dummies capturing neighbourhood to Bavaria and Rhineland-Palatine/Hessia (which are treated jointly due to the very low number of observations for both states), respectively. This shows that our results are largely driven by Bavaria, even though the effect for the other border likewise remains positive. Finally, we check whether our findings can be attributed to increasing competitive pressure from out-of-state jurisdictions, or rather derive from weakening competitive pressure from in-state jurisdictions, as we move closer to the border. To answer this, we re-run our analysis for politicians’ opinions regarding in-state (column 4) and out-of-state jurisdictions (column 5) separately (i.e., the two components in RPC^{state}). The results indicate that closeness to a border has *both* a negative effect on perceiving intra-state competition (possibly because they have less internal competitors located at a short distance) *and* a positive effect on perceiving out-of-state competition. Yet, only the latter reaches statistical significance at conventional levels, suggesting that our re-

⁸The ESPON indicator is calculated at the county level by summing up the population of all European regions weighted by the time needed to travel there by car in the year 2006. This is then standardized by setting the European average at 100 (see Vickerman, Spiekermann, and Wegener (1999) for an overview of accessibility indicators).

sults are driven to a larger extent by the perceived competitive pressure from out-of-state jurisdictions.

Before turning to the analysis of international borders, we should note that our control variables perform fairly consistently. Most significantly, we find that the local system of fiscal equalisation indeed appears to affect the competition perceptions of decision-makers in municipalities with low (and, to a lesser extent, medium) fiscal capacity. In line with the idea that this system compensates such municipalities for losses in their tax bases relative to other municipalities in the state, their mayors perceive that competition is rather a local issue. We also confirm that decision-makers of highly agglomerated cities perceive competitive pressures to come relatively more from extra-regional municipalities. This reflects that they are generally more exposed to external competition from more distant cities (see also Janeba and Osterloh, 2012). Neither the local unemployment rate nor the population of working age plays a significant role in politicians' perceptions. Furthermore, political variables play no consistent role in our estimations.

[Figure 2 about here]

4.2 Effect of international borders

The results relating to international borders are summarised in table 2. In columns (1a) and (1b), we do not differentiate between the French and Swiss border and focus on direct adjacency to either of these countries. The estimated coefficient of the constant in the OLS regression is again negative and even larger than in the previous section. Although we once again find that this effect is counteracted by direct neighbourhood to the border (see the top row of table 2), this reductive effect is both substantively and statistically ($p < 0.10$) weaker than in the sub-national case. Both these results imply that international borders are perceived by local politicians as 'stronger' borders than regional ones (supportive of H2). Interestingly, this finding helps illuminate recent failures to find cross-border interactions by means of traditional spatial econometrics techniques in the tax setting of French and German municipalities (Cassette et al., 2012). Indeed, our findings suggest that politicians generally perceive country borders to be relatively strong,

and therefore focus predominantly on the decisions of neighbours on their own side of the border. The only exceptions are those in charge of a municipality in very close proximity to this border, as we will see below.

In order to evaluate H3, we differentiate between the effect of the Swiss and the French border. The results indicate that the effect of the Swiss border is about twice the size of that of the French one (column 2b). It also is significantly different from zero at the 10% significance level (column 2a), whereas the effect of adjacency to France remains statistically insignificant. Given the different nature of both borders, one tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU).⁹ Hence, our results appear supportive of the idea that the effect of international borders varies with the cultural and institutional dimensions of such borders (as proposed in H3). Still, an alternative explanation may lie in Switzerland's aggressive corporate tax policy. The average effective tax rates of the adjacent cantons' capitals ranged from 13.9 to 20.9% in 2009, compared to 34.2% in the French city of Strasbourg and between 21.9 and 26.8% in the state of Baden-Württemberg (see BAK Basel 2009). Hence, German mayors may feel that they are in competition with Swiss municipalities because, by having lower taxes, Swiss jurisdictions seem to be competing *with them*.

[Table 2 about here]

We obtain the results in columns (3a,b) and (4a,b) by replacing the border dummies with the minimum distance to the closest foreign municipality. As before, the value of the constant term in the OLS regressions rises above the average value, indicating that mayors' perception of municipalities in their own state as closer competitors than those beyond the country's borders is weaker in municipalities *on* the border than in municipalities away from the border.¹⁰ The difference, however, is much weaker than in the

⁹A potential problem here is that many direct neighbours to France have a sizeable distance to the next French city because the river Rhine runs between them. Restricting the sample to those municipalities with a direct connection to France via a bridge or ferry (13 observations), however, does not affect our results in terms of both coefficient estimate and statistical significance (available upon request).

¹⁰Note that the intercept in column (4b) obviously becomes meaningless since no municipality can at once be at 0km distance from France, Switzerland *and* Austria. Hence, this interpretation is only valid for column (3b).

regional-border case, reinforcing our earlier finding that local politicians perceive international borders as ‘stronger’ borders than regional ones. As before, we also find a significant non-linear effect of proximity to the border. This finding is replicated when separating France, Switzerland and Austria, although the results for Austria remain statistically insignificant.¹¹ The associated natural spline regressions, depicted in figure 3, differ from those for the state borders in two central respects. First, we observe that the border effect is much stronger in the case of country borders (as could also be gathered from a comparison of tables 1 and 2). Second, the proximity effect is much weaker than in the regional-border case and ceases after a much shorter distance. Already at a distance of 10.2 km, the lower bound of the confidence interval intersects the abscissa indicating the mean value. In other words, for municipalities more than 10.2 kilometres away from the neighbouring country, ‘proximity’ to the border no longer affects decision-makers’ perceptions of the intensity of international competition.¹² Even so, 77 municipalities (6.9% of all municipalities in the state) are located within this critical distance. The geographical location of municipalities within the critical distance to a state or country border is visualised in figure 4.

[Figure 3 about here]

[Figure 4 about here]

In table 7 in the appendix, we present a set of robustness checks largely corresponding to those for the state-border analysis – and with similar results. First, adding the distance to the closest in-state urban centres (column 1) and the road accessibility index (column 2) does not significantly affect the findings for our key border variables (and these variables again do not significantly add to the explanatory power of the model in themselves). Second, a placebo regression including a dummy indicating neighbourhood to a state border (column 3) demonstrates that only neighbourhood to an international

¹¹Although Baden-Württemberg does not share a border with Austria, we pick it up here as it is the nearest country for a small number of municipalities.

¹²This might in part explain the non-significant effects for Austria discussed above. Indeed, since there are only few municipalities with a rather low distance to Austria in the sample, the fact that the effect of proximity to other countries ceases quickly implies we cannot expect a strong effect for Austria.

border affects the perception of intensity of competition with foreign jurisdictions – as expected. Finally, using the perceived competitive pressure from within the state (column 4) and from foreign jurisdictions (column 5) separately as dependent variables (i.e., the two components in $RPC^{country}$), we find that neighbourhood to an international border again weakly reduces the perceived competitive pressure from within the state (which seems reasonable due to the lower number of in-land neighbours of border municipalities) whereas it has a strong positive effect (in both size and significance) on perceived competitive pressure from abroad; consequently, it is mainly the latter effect which drives the findings in table 2.

4.3 Perceptions versus actions

As our analysis so far only regards politicians’ expressed opinions, one might wonder whether these opinions effectively bear connection to politicians’ actions (rather than reflect ‘cheap-talk’) when it comes to setting tax rates. To this end, we briefly take a closer look at German municipalities’ two main tax instruments: a local business tax called ‘Gewerbesteuer’ (with corporate profits as its tax base) and a residential land tax called ‘Grundsteuer B’. Economic theory (e.g., Borck (2003)) predicts that increased corporate tax competition induces a shift in the tax burden from mobile tax bases (in this case, the local business tax) to immobile tax bases (the land tax). Consequently, if politicians in municipalities located close to an (inter)national border perceive somewhat lower competitive pressure from within their own state (possibly due to a lower number of in-state neighbours; see above) and simultaneously perceive substantial, albeit imperfect, protection from competitors across the (inter)national border (due to the ‘border effect’; see above), a close connection between politicians’ beliefs and actions should translate into business taxes being relatively higher near (inter)national borders compared to residential land taxes.

We test this prediction by using the difference between the collection rates of both taxes (i.e., $taxgap = businesstax - landtax$) as the dependent variable.¹³ This comparative measure is used to eliminate effects arising from different expenditure pressures across

¹³The collection rates are the decision parameters of the German municipalities. They determine how the uniform base tax rates (5% on profits and 0.2% on property value) are increased in order to determine the applicable tax rates (Buettner (2003)).

jurisdictions which affect the levels of all taxes (see Janeba and Osterloh (2012) for a more detailed discussion). As can be seen from column (1) of table 3, the results are in line with this prediction. First of all, municipalities near an international border make relatively more use of business taxes (compared to land taxes) than the average inland municipality, but the same effect is much weaker and statistically insignificant for neighbourhood to a state border. This pattern is reasonable given the much smaller ‘closing-off’ effect we found for state compared to international borders in sections 4.1 and 4.2. Secondly, separating between the French and Swiss borders shows a positive coefficient estimate for both, but is stronger and more robust for the French border. Thus our previous finding that German municipalities perceive stronger competitive pressure from their Swiss counterparts translates into them maintaining relatively higher tax rates on mobile factors along the ‘safer’ French border. Hence, overall, there appears to be a relevant connection between politicians’ beliefs and actions as regards the setting of tax rates depending on the levels of competition they perceive.

[Table 3 about here]

5 Concluding discussion

A common characteristic of existing work on local-level spatial policy interactions is that the specification of the neighbourhood matrix, which defines who is expected to compete with whom, includes only jurisdictions *within* the region under study. Consequently, it ignores the potential influence of jurisdictions in neighbouring regions. Similarly, studies of international tax competition generally define the neighbourhood matrix with respect to a limited number of countries (due to data limitations). The theoretical literature on spatial econometrics illustrates that if spatial dependence transcends the boundaries thus imposed by the researcher and/or the dataset, such restriction may induce biased inferences on the spatial parameter (Griffith, 1983, 1985; Griffith and Amrhein, 1985; Anselin, 1988). Analysing German local politicians’ perceptions about their municipality’s main competitors in the struggle for business investments (i.e., other jurisdictions *a*) in their own region, *b*) in other regions in the same country, or *c*) in other countries), this article assessed the practical relevance of such boundary value problem, and, as such, evaluated how worried we should be about its potential threat to empirical findings.

Our results show that location close to a border significantly undermines the perception that the fiercest competitive pressure derives from jurisdictions *within* their own state. Moreover, this effect is stronger for, and is felt at further distances from, subnational than inter-national borders. These results have two important practical implications. First, they provide a parsimonious explanation for the presence of cross-regional local-level strategic interactions (e.g., Eugster and Parchet, 2011) and the difficulties to identify equivalent cross-country interactions (Cassette et al., 2012). Indeed, our findings suggest that it is politicians' perceptions about the relative constraints imposed by these different types of borders that defines the (absence of) reaction to extra-regional jurisdictions' actions. Moreover, our empirical approach allows us to quantify the spatial extent of such border-related effects. Whereas the proximity to international borders ceases to affect local decision-makers' opinions at a distance of about 10.2km, the proximity to subnational borders plays a role up to about 20km. Interestingly, the latter finding is in close accordance with recent findings by Eugster and Parchet (2011) using a sample of Swiss municipalities separated by a cultural border. They show that jurisdictions' tax choices are constrained by tax competition at a distance of up to 20 kilometres. Our results suggest that this may well result from the fact that decision-makers do not consider municipalities beyond this critical distance as their rivals in the competition for mobile capital. This also corroborates van Dijk and Pellenbarg's (2000) finding that firm migration is mostly short-distance; short-distance moves allow firms to keep most of their workforce since it is within a reasonable commuting distance. Moreover, within the identified critical distance firms can still maintain relations with local suppliers or selling markets as well as local networks.

Second, our results imply that the likelihood of obtaining biased estimates – if one refrains from taking inter-border links into account and specifies an inappropriately constrained reference group of competing jurisdictions (Griffith, 1983, 1985; Griffith and Amrhein, 1985; Anselin, 1988) – is substantial; indeed, no less than 21% of all municipalities in our sample are located within the critical distance to a state border, and 9.5% within the critical distance to another country. Moreover, based on our finding that different types of borders can have different effects (e.g., regional versus national borders, France versus Switzerland), the specific context of the jurisdiction should ideally be taken into account as this reflects the extent to which two jurisdictions separated by a border

are close or distant substitutes.

Our results thus emphasize the need to take the ‘edge effect’ seriously in analyses of spatial fiscal interactions. At the very least, robustness analyses should be presented indicating whether or not it is likely to affect the inferences from the analysis. In this respect, it is interesting to observe that the various potential solutions to the boundary problem discussed in the theoretical literature include constructing a buffer zone along the boundary (i.e. dropping the border jurisdictions), using dummy variables to differentiate jurisdictions at the boundary, or employing statistical techniques that cast the boundary problem as one of missing data along the periphery of the study area (see Griffith, 1983, who discusses nine different solution concepts). While the relative (de)merits of these various correction concepts lie credibly beyond the scope of this paper (for such discussion, see Griffith, 1985; Anselin, 1988), almost all of the discussed methods require the designation of ‘border jurisdictions’ or ‘buffer zones’. As such designation should, ideally, not proceed on an ad hoc basis, but rather be guided by the data at hand, our analysis suggests that corrections may be required on a different ‘scale’ depending on the type of border one faces in the sample analysed: i.e., whereas for international borders it appears appropriate to restrict the correction to jurisdictions immediately adjacent to the border, national borders appear to require a (considerably) wider correction.

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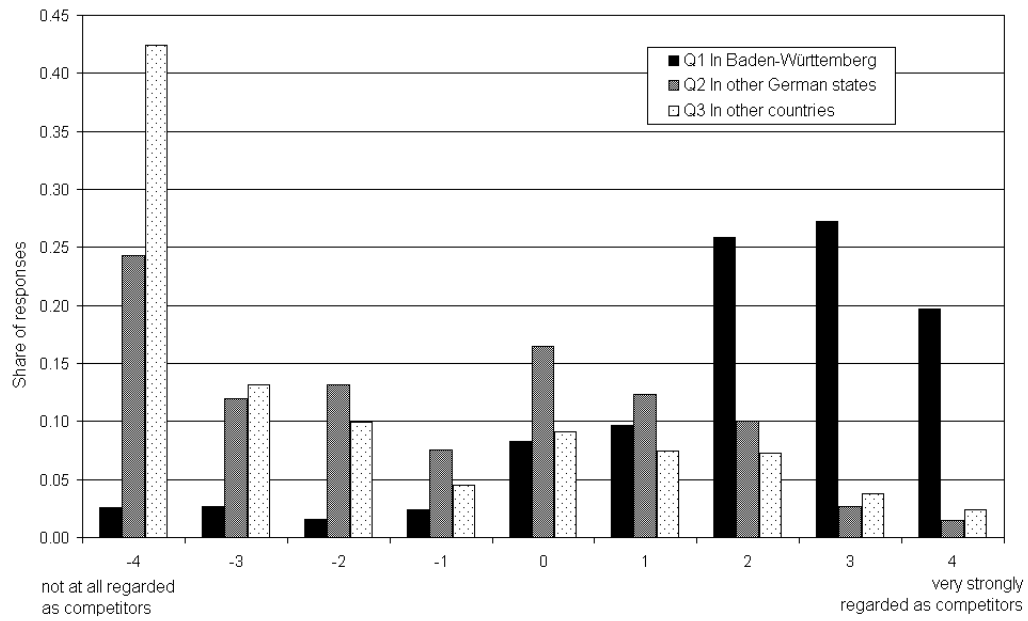
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6 Appendix

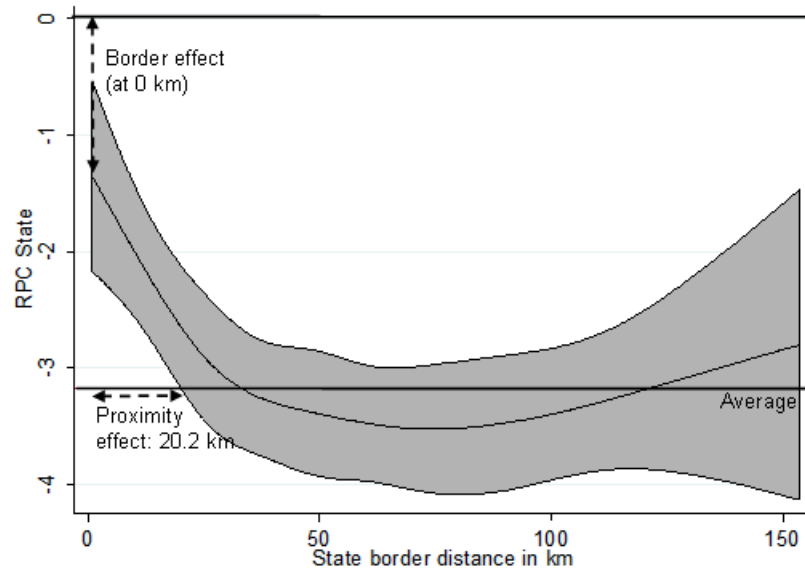
[Table 4, 5, 6 and 7 about here]

Figure 1: Survey results, perceived competitive pressures (N=712)



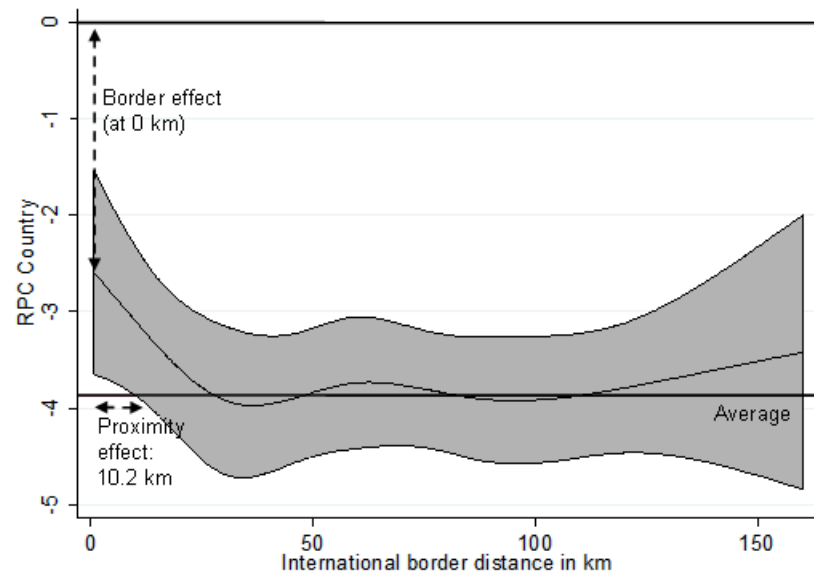
For each of the three questions, the percentages add up to 100%. Source: Own calculations

Figure 2: Subnational borders, natural spline regressions



Note: Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area.
Straight line represents mean value of $RPC^{state} = -3.17$.

Figure 3: International borders, natural spline regression



Note: Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area.
Straight line represents mean value of $RPC^{country} = -3.88$.

Figure 4: Location of municipalities within critical distances

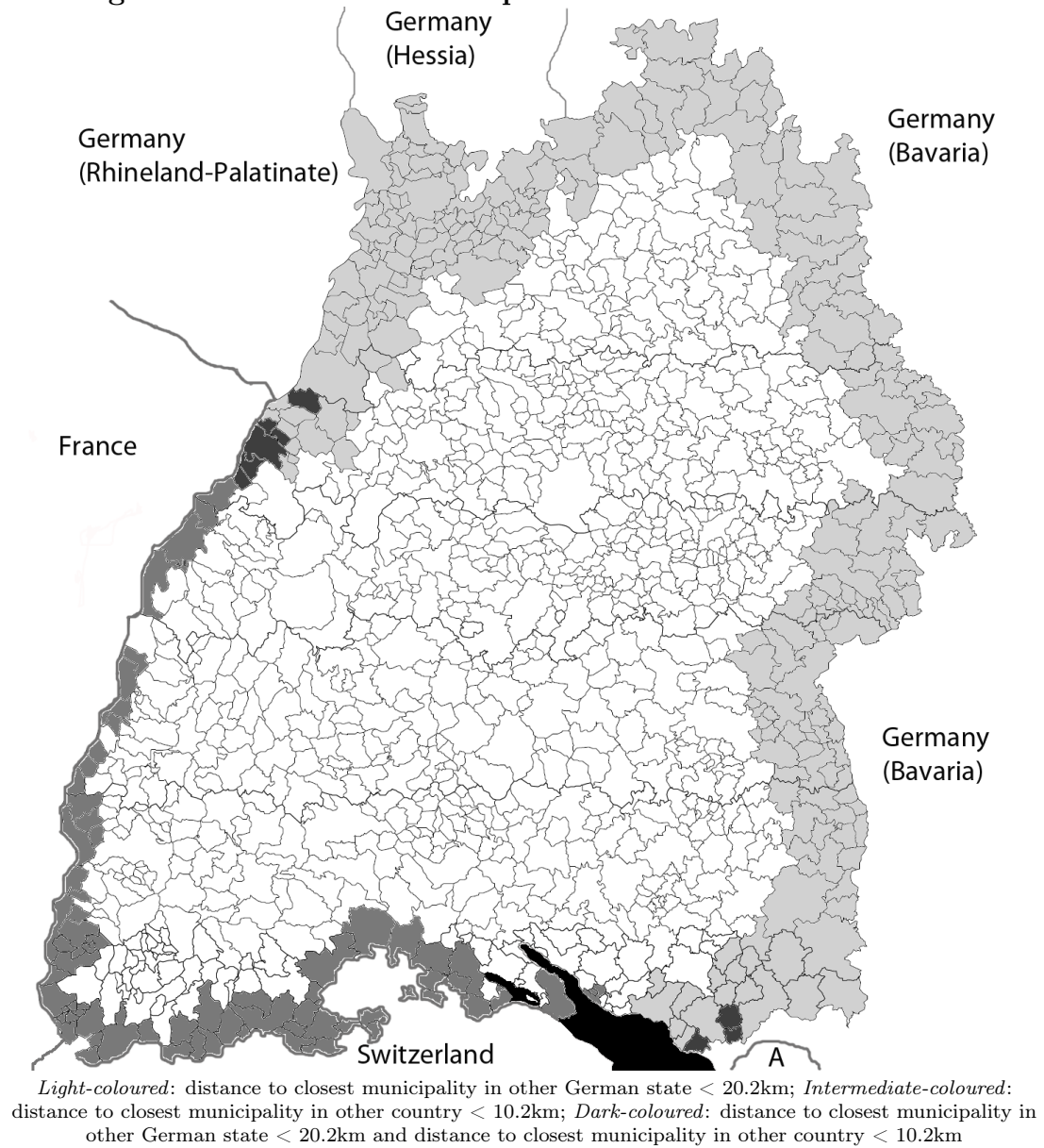


Table 1: Regression results, effect of subnational borders

Dependent variable	(1a)	(2a)	(1b)	(2b)
	Relative Perceived Competition with municipalities in other states (RPC^{state})			
	oprobit	oprobit	ols	ols
Neighbour state border	0.883*** (0.160)		1.953*** (0.334)	
State Border Distance		-0.022*** (0.004)		-0.049*** (0.009)
State Border Distance ²		0.000135*** (0.00003)		0.000302*** (0.00007)
Unemployment rate _{t-1}	0.079 (8.134)	1.603 (8.133)	-2.706 (18.86)	0.822 (18.85)
Population Working-age _{t-1}	-2.322 (1.981)	-3.334* (1.984)	-5.423 (4.579)	-7.706* (4.570)
Left-wing _t	0.404 (0.407)	0.137 (0.398)	0.870 (0.950)	0.286 (0.927)
Free Voters _t	-0.048 (0.206)	-0.008 (0.207)	-0.147 (0.473)	-0.052 (0.477)
Fiscal capacity _t : low	-0.359** (0.152)	-0.408*** (0.152)	-0.766** (0.355)	-0.877** (0.354)
Fiscal capacity _t : medium	-0.253* (0.149)	-0.224 (0.146)	-0.527 (0.344)	-0.465 (0.339)
Mayor	0.061 (0.083)	0.070 (0.082)	0.120 (0.192)	0.141 (0.190)
Log(Population) _{t-1}	-0.077 (0.067)	-0.032 (0.069)	-0.172 (0.158)	-0.073 (0.163)
Regional centre	0.647** (0.270)	0.567** (0.283)	1.567** (0.643)	1.392** (0.673)
Secondary centre	0.303** (0.151)	0.277* (0.149)	0.710** (0.356)	0.651* (0.349)
Constant			-3.155*** (0.225)	-1.684*** (0.326)
Observations	712	712	712	712
(Pseudo) R^2	0.016	0.017	0.067	0.071

Robust standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 2: Regression results, effect of international borders

	Relative Perceived Competition with municipalities in other countries ($RPC^{country}$)							
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
	oprobit	oprobit	oprobit	oprobit	OLS	OLS	OLS	OLS
Neighbour International Border	0.342* (0.192)				0.942* (0.548)			
Neighbour Int. Border: FRA		0.209 (0.275)				0.652 (0.715)		
Neighbour Int. Border: SUI		0.470* (0.259)				1.226 (0.805)		
Int. Border Distance			-0.00759** (0.00386)				-0.0215** (0.0108)	
Int. Border Distance ²			0.00005* (0.00003)				0.000132* (0.00008)	
Int. Border Distance: FRA				-0.0143* (0.00808)				-0.0391* (0.0229)
Int. Border Distance ² : FRA				0.00006** (0.00003)				0.000159** (0.00007)
Int. Border Distance: SUI				-0.00596 (0.00409)				-0.0175 (0.0116)
Int. Border Distance ² : SUI				0.00005 (0.00004)				0.000149 (0.000119)
Int. Border Distance: AUT				0.000530 (0.00516)				-0.00008 (0.0143))
Int. Border Distance ² : AUT				-0.00003 (0.00003)				-0.00007 (0.00008)
Unemployment rate _{t-1}	1.201 (8.508)	1.306 (8.517)	3.289 (8.660)	5.652 (8.951)	0.882 (23.57)	1.097 (23.60)	7.020 (24.01)	13.52 (24.88))
Population Working-age _{t-1}	-1.786 (1.876)	-1.645 (1.894)	-1.553 (1.887)	-1.601 (1.934)	-4.494 (4.984)	-4.188 (5.029)	-3.894 (5.024)	-3.972 (5.161)
Left-wing _t	0.0661 (0.405)	0.0574 (0.404)	0.125 (0.405)	0.191 (0.417)	-0.108 (1.097)	-0.129 (1.096)	0.0623 (1.100)	0.272 (1.136)
Free Voters _t	-0.338 (0.207)	-0.343* (0.207)	-0.271 (0.214)	-0.252 (0.221)	-0.971* (0.541)	-0.981* (0.541)	-0.775 (0.561)	-0.714 (0.581)
Fiscal capacity _t : low	-0.367** (0.164)	-0.366** (0.164)	-0.373** (0.164)	-0.379** (0.167)	-1.049** (0.456)	-1.048** (0.456)	-1.069** (0.457)	-1.084** (0.464)
Fiscal capacity _t : medium	-0.183 (0.157)	-0.185 (0.157)	-0.181 (0.157)	-0.181 (0.157)	-0.609 (0.439)	-0.612 (0.439)	-0.606 (0.439)	-0.605 (0.440)
Mayor	0.0790 (0.0848)	0.0764 (0.0850)	0.0784 (0.0845)	0.0773 (0.0845)	0.193 (0.232)	0.187 (0.232)	0.193 (0.230)	0.189 (0.231)
Log(Population) _{t-1}	-0.0818 (0.0748)	-0.0841 (0.0751)	-0.0667 (0.0747)	-0.0633 (0.0758)	-0.207 (0.207)	-0.211 (0.208)	-0.164 (0.206)	-0.156 (0.207)
Regional centre	0.620** (0.300)	0.613** (0.302)	0.545* (0.300)	0.477 (0.309)	1.770** (0.879)	1.753** (0.884)	1.553* (0.877)	1.354 (0.898)
Secondary centre	0.278* (0.166)	0.281* (0.166)	0.259 (0.167)	0.231 (0.170)	0.814* (0.467)	0.820* (0.469)	0.757 (0.470)	0.681 (0.475)
Constant					-3.757*** (0.251)	-3.748*** (0.252)	-3.041*** (0.403)	-0.464 (2.606)
Observations	712	712	712	712	712	712	712	712
(Pseudo) R^2	0.008	0.008	0.008	0.009	0.034	0.035	0.035	0.040

Robust standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 3: Analysis of tax setting, OLS regressions

Dependent variable	Tax Gap	
	(1)	(2)
Neighbour International Border	13.697** (6.617)	
Neighbour International Border: FRA		13.127** (5.120)
Neighbour International Border: SUI		12.270 (11.018)
Neighbour State Border	0.045 (4.117)	-0.010 (4.117)
Unemployment rate _{t-1}	-633.655*** (198.433)	-640.952*** (198.836)
Population Working-age _{t-1}	98.053 (78.660)	98.154 (75.109)
Left-wing _t	-9.379 (10.948)	-9.372 (10.973)
Free Voters _t	3.064 (5.946)	2.917 (5.949)
Fiscal capacity _t : low	-29.895*** (3.938)	-29.856*** (3.942)
Fiscal capacity _t : medium	-17.366*** (3.683)	-17.351*** (3.683)
Log(Population) _{t-1}	0.530 (1.704)	0.497 (1.707)
Regional centre	-37.487*** (14.126)	-37.277*** (14.107)
Secondary centre	-9.204** (4.167)	-9.079** (4.169)
Constant	21.220*** (2.328)	21.231*** (2.303)
Observations	1030	1030
R ²	0.12	0.11

Robust standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 4: Means of respondents and non-respondents

Variable	Mean: Respondents	Mean: Non-respondents	t-test for equal mean (p-value)
Neighbour State Border	0.076	0.066	0.576
State Border Distance	50.871	52.938	0.378
Neighbour International Border	0.051	0.072	0.165
Neighbour Int. Border: FRA	0.025	0.035	0.405
Neighbour Int. Border: SUI	0.025	0.041	0.176
Int. Border Distance	61.268	61.074	0.940
Int. Border Distance: FRA	80.708	86.778	0.044
Int. Border Distance: SUI	101.664	92.393	0.013
Int. Border Distance: AUT	138.882	129.812	0.006
Log(Population)	8.710	8.357	0.000
Unemployment rate	0.019	0.018	0.010
Share working-age	0.655	0.657	0.284
Left wings	0.185	0.158	0.008
Free voters	0.465	0.534	0.001
Fiscal Capacity: low	0.389	0.465	0.022
Fiscal Capacity: medium	0.518	0.475	0.198
Regional centre	0.020	0.006	0.109
Secondary centre	0.103	0.069	0.088

Table 5: Variable definitions

Variable	Description	Mean	Std. Dev.	Min	Max	Source
RPC^{state}	Relative perceived competition with municipalities in other German states	-3.177	2.418	-8	5	Own survey
$RPC^{country}$	Relative perceived competition with municipalities in other countries	-3.956	2.820	-8	7	Own survey
Log(Population)	Logarithm of total population	8.710	0.978	5.814	13.296	Statistical Office of Baden-Württemberg (SOBW)
Unemployment rate	Share of registered unemployed in total population	0.019	0.006	0.006	0.040	SOBW
Share Workage	Share of population aged between 15 and 65 years	0.655	0.021	0.571	0.742	SOBW
Left wing	Seat share of left-wing parties in local council	0.185	0.150	0	0.571	SOBW
Free voters	Seat share of free voter unions ("Freie Wählervereinigungen") in local council	0.465	0.297	0	1	SOBW
Fiscal Capacity: low	Dummy = 1 if fiscal capacity is smaller than 0.6; highest transfers from the local system of fiscal equalisation	0.389	0.488	0	1	SOBW
Fiscal Capacity: medium	Dummy = 1 if fiscal capacity is between 0.6 and 1.0; moderate transfers from the local system of fiscal equalisation	0.518	0.500	0	1	SOBW
Regional centre	Dummy = 1 if classified as regional centre ('Oberzentrum'), highest category of centrality in German spatial planning policy	0.020	0.139	0	1	Wirtschaftsministerium Baden-Württemberg
Secondary centre	Dummy = 1 if classified as secondary centre ('Mittelzentrum'), second highest category of centrality in German spatial planning policy	0.103	0.304	0	1	Wirtschaftsministerium Baden-Württemberg
Mayor	Dummy = 1 if response directly from mayor	0.475	0.500	0	1	Own survey
Accessibility	Potential accessibility by car in 2006, EU-25 average = 100	178.094	16.421	146.7	215.3	ESPON
TaxGap	Collection rate local business tax - collection rate land tax	14.226	35.519	-260	300	own calculations based on SOBW

Table 6: Robustness checks, effect of subnational borders, ordered probit regressions

Dependent variable	(1)	(2)	(3)	(4)	(5)
	Relative Perceived Competition with municipalities in other states			Absolute Perceived Competition with municipalities	
		(RPC^{state})		in Baden-Württemberg	in other states
Neighbour state border	0.813*** (0.169)	0.856*** (0.160)		-0.003 (0.145)	1.017*** (0.180)
Regional centre distance	0.005 (0.003)				
Secondary centre distance	0.005 (0.011)				
Accessibility		0.004 (0.002)			
Neighbour state border: Bavaria			1.071*** (0.142)		
Neighbour state border: Hestia/R-P			0.453 (0.374)		
Neighbour international border			0.045 (0.168)		
Unemployment rate $_{t-1}$	-1.054 (8.409)	-1.798 (8.243)	1.012 (7.960)	2.589 (7.808)	3.006 (7.825)
Population Working-age $_{t-1}$	-1.779 (2.002)	-2.620 (1.983)	-2.433 (1.981)	0.782 (2.012)	-1.772 (2.085)
Left-wing $_t$	0.577 (0.422)	0.312 (0.409)	0.498 (0.404)	-0.632 (0.444)	0.078 (0.412)
Free Voters $_t$	-0.040 (0.205)	-0.040 (0.205)	-0.031 (0.207)	0.158 (0.226)	0.155 (0.220)
Fiscal capacity $_t$: low	-0.367** (0.153)	-0.360** (0.152)	-0.359** (0.153)	0.0572 (0.149)	-0.377*** (0.138)
Fiscal capacity $_t$: medium	-0.249* (0.149)	-0.252* (0.149)	-0.253* (0.149)	0.098 (0.140)	-0.182 (0.130)
Mayor	0.053 (0.083)	0.061 (0.083)	0.049 (0.084)	0.099 (0.085)	0.140* (0.082)
Log(Population) $_{t-1}$	-0.076 (0.067)	-0.076 (0.067)	-0.079 (0.067)	0.323*** (0.075)	0.227*** (0.071)
Regional centre	0.574** (0.276)	0.686** (0.269)	0.641** (0.276)	-0.647** (0.262)	0.122 (0.232)
Secondary centre	0.332* (0.172)	0.327** (0.153)	0.293* (0.151)	-0.0168 (0.148)	0.249* (0.143)
Observations	712	712	712	716	715
Pseudo R^2	0.017	0.017	0.017	0.014	0.035

Robust standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 7: Robustness checks, International borders, ordered probit regressions

Dependent variable	Relative Perceived Competition			Absolute Perceived Competition	
	with municipalities			with municipalities	
	in other countries			in Baden-Württemberg	in other countries
	$(RPC^{country})$				
	(1)	(2)	(3)	(4)	(5)
Neighbour International Border	0.335* (0.192)	0.342* (0.194)	0.358* (0.192)	-0.203 (0.146)	0.376** (0.187)
Neighbour International Border: FRA					
Neighbour International Border: SUI					
Neighbour State Border			0.161 (0.136)		
Distance Regional Centre	0.001 (0.003)				
Distance Secondary Centre	0.006 (0.010)				
Accessibility		-0.000 (0.002)			
Unemployment rate $_{t-1}$	1.280 (8.798)	1.229 (8.638)	1.307 (8.526)	2.243 (7.836)	2.776 (8.643)
Population Working-age $_{t-1}$	-1.538 (1.905)	-1.782 (1.886)	-1.813 (1.874)	0.922 (2.018)	-1.271 (1.999)
Left-wing $_t$	0.120 (0.422)	0.0674 (0.409)	0.0952 (0.407)	-0.640 (0.442)	-0.309 (0.431)
Free Voters $_t$	-0.335 (0.207)	-0.338 (0.208)	-0.323 (0.207)	0.137 (0.227)	-0.287 (0.230)
Fiscal capacity $_t$: low	-0.375** (0.164)	-0.367** (0.164)	-0.378** (0.164)	0.0691 (0.150)	-0.479*** (0.159)
Fiscal capacity $_t$: medium	-0.185 (0.156)	-0.183 (0.157)	-0.191 (0.157)	0.107 (0.140)	-0.157 (0.147)
Mayor	0.0730 (0.0855)	0.0790 (0.0848)	0.0768 (0.0849)	0.0923 (0.0850)	0.131 (0.0898)
Log(Population) $_{t-1}$	-0.081 (0.075)	-0.082 (0.075)	-0.083 (0.075)	0.322*** (0.074)	0.193** (0.078)
Regional centre	0.571* (0.304)	0.620** (0.300)	0.610** (0.297)	-0.647** (0.265)	0.208 (0.238)
Secondary centre	0.318* (0.181)	0.278* (0.166)	0.275* (0.165)	-0.010 (0.148)	0.241 (0.155)
Observations	712	712	712	716	716
Pseudo R^2	0.008	0.008	0.008	0.014	0.028

Robust standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

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